at all. The rule would evidently apply safely in every such case, unless the ships had nearly equal manœuvring powers, and were then so placed that their turning arcs coincided; two concomitant conditions almost impossible to exist. Needless to say that the results of actual collisions exactly follow the diagram.

It now remains to express my general belief as to the *Victoria*. The paths in turning given of the *Edinburgh* and *Dreadnought* are those of two of the ships which were present on the occasion of her loss. Whether or not they had these traces on board I do not know. There is no mention of such things in the Minutes of the Court Martial, and the questions and answers never go beyond the work of 1865-74. But it is to me inconceivable that the mistake could have been made had such traces been familiar in every ship, and had the late Sir George Tryon been supplied with those of all his ships as a matter of course.

I think that, while blame for this accident has been authoritatively and unauthoritatively strongly thrown on individuals, it is impossible for anyone realising what I have written, to blame any one individual.

P. H. COLOMB.

THE TUNICATE.

FAR down in the depths of the ocean
The Tunicate's active and gay;
It hasn't the ghost of a notion
How cellular tissues decay.

With a notochord all down its central part,
It is surely a wee morsel vain;
For it knows it possesses a ventral heart,
Not to speak of a dorsal brain.

Then down in the depths of the ocean
The Tunicate's lightsome and free;
It hasn't the ghost of a notion
How degenerate old age can be.

For it must be a pleasing sensation
That, if other resources all fail,
You can never come quite to starvation
If you've been endowed with a tail.

Then down in the depths of the ocean
The Tunicate's careless and glad;
It hasn't the ghost of a notion
Its instincts all tend to the bad.

Till, wearied by youthful diversion,
It thinks it will rest on a stone.
It becomes disinclined for exertion.
—Ah! Tunicate, you are undone!

Now, down in the depths of the ocean
That Tunicate's losing his tail:
As though he had swallowed a potion,
His mental resources all fail.

His brain and his nerves they degenerate,
His notochord meets a like fate;
You hardly can class him, at any rate
He's no longer a true vertebrate.

And down in the depths of the ocean
He gets him a cellulose frock;
And all just because of that notion
Of taking a rest on a rock.

And there is a moral deduction,
Which I'd like you to cogitate often:
Don't we all know of stones where, by suction,
We stick, till our intellects soften?

R. M.

NOTES.

THE Croonian lecture of the Royal Society for 1894 is to be delivered by S. Ramón y Cajal, Professor of Histology and Pathological Anatomy in the University of Madrid. The subject will be "The Minute Structure of the Nervous System," and the date, March 1.

ON February 16 next, Prof. E. Haeckel celebrates his sixtieth birthday, and in honour of the event it is proposed to place his marble bust in the Zoological Institute of Jena. Friends and admirers of Haeckel who desire to support this object, should send their subscriptions to Prof. Richard Semon, Jena.

MISS KLUMPKE, the well-known lady assistant at the Paris Observatory, took the degree of Doctor of Mathematical Science at the Sorbonne, on December 14. The subject of her thesis was Saturn's rings.

PROFS. BARNARD AND ASAPH HALL have been awarded the Arago Prize for Astronomy by the Paris Academy of Sciences.

PROF. C. F. MABERY has received a grant of 300 dollars from the American Academy of Arts and Sciences, to enable him to carry on his investigations of the American sulphur petroleums.

THE death is announced of Dr. J. Boehm, Professor of Botany in Vienna University, of Dr. D. A. Brauns, Extraordinary Professor of Geology in Halle University, and of Dr. P. A. Spiro, Professor of Physiology in the University of Odessa.

IT appears from the will of the late Sir Andrew Clarke that he has bequeathed the sum of £500 to the London Hospital Medical College, for the foundation of a scholarship.

AT a special general meeting of the Royal Institution of Great Britain, held on Friday last, the following resolution was unanimously adopted:—"That the members of the Royal Institution of Great Britain, in special general meeting assembled, hereby record their deep regret at the death of Dr. John Tyndall, D.C.L., LL.D., F.R.S., who was for forty years connected with the institution as lecturer, professor, and honorary professor of natural philosophy, and who by his brilliant abilities and laborious researches nobly promoted the objects of the institution and conspicuously enhanced its reputation, while at the same time he extended scientific truth, and rendered many new additions to natural knowledge practically available for the service of mankind; and that the members of the Royal Institution further desire to convey to Mrs. Tyndall an expression of their sincere sympathy and condolence with her in the bereavement she has sustained in the loss of her gifted and distinguished husband."

WE learn from the *Victorian Naturalist* that Baron von Mueller has withdrawn from the directorship of the International Academy for Botanic Geography of Le Mans.

AFTER remaining dormant throughout historic time the volcano El Calbuco in the Andes (Lat. 41° 21′ S. Long. 72° 38′ W.) has renewed its activity. Mr. A. E. Nogues described the eruption in a communication to the Paris Academy, on December 11. Some months ago, columns of vapour began to issue from the crater, their escape being accompanied by the usual subterranean noises, seismic movements, and electrical phenomena. This stage was followed by the ejection of scoriæ and rock fragments in such large quantities that the surrounding woods were burnt up, and the ground raised to a comparatively high temperature. At the present time the volcano is in full play. Lava has issued from the sides of the cone and flowed down to the base, forming streams of molten rock which have barred the way of torrents and changed the directions of rivers. This phase of the eruption, however, marks a decline of activity, and will in all probability be followed by the quiet emission of gaseous products.

BY the generosity of M. G. Solvay, two important institutes have been established at Brussels, namely, a University Institute of Physiology, and an institute specially designed for carrying on electro-biological researches. In May last M. Solvay presented the town with a sum of two hundred thousand francs for the erection and equipment of the University building, stipulating only that the University should provide courses in physiological chemistry, and medical physics relating to the connection between physiology and electricity. This condition was laid down with the object of improving the instruction at the University, and developing the spirit of investigation in the minds of students, thus giving them the ability to carry on physiological researches independently in a special laboratory. For students thus trained, and desiring to apply their knowledge to research of a special kind, the Solvay Institute has been established. At the inauguration of this institute, on December 14, M. Solvay delivered an address on the rôle of electricity in the phenomena of life. He remarked that his conviction was that the phenomena of life could probably be explained by the action of physical forces, and that, among these forces, electricity played an important part. It was to obtain evidence on this point, by the observation and study of facts, that M. Solvay was led to found the institute that bears his name.

AN appeal has been made for funds to establish a small station at Millport for the study of the marine zoology and botany of the Firth of Clyde and West of Scotland generally. It is intended to establish in connection with the station a representative collection of local marine fauna and flora, and, should the funds permit, to construct tanks for the study of living animals and plants. A station, on a limited scale—centred in a small vessel called the *Ark*—has existed at Millport for some years, and has been found exceedingly useful. During 1891 and 1892, the Royal Society of London gave a grant of £100 for the investigation of the algæ of the Clyde sea area. This work was carried on chiefly in the *Ark;* the result being that about eighty species new to the district were found, and of these between twenty and thirty were new to Britain, and about six new to science. The advantages which a permanent station would offer to students of natural history are sufficiently obvious. As the scheme has the cordial approval of many of the Professors at Glasgow University, and also the support of local naturalists, there should be little difficulty in obtaining the contributions required to realise it.

WE learn from the Allahabad *Pioneer* that subscription lists will be opened immediately for the Pasteur Institute scheme. The Amritsar municipality have sanctioned a donation of 1000 rupees and an annual subscription of 500 rupees. The Gurdaspur municipality had previously promised a donation and an annual grant, and among other donations promised are 1000 rupees from Khan Bahadur Barjorjee D. Patel of Quetta. The Government of India have promised to give the services of a qualified medical officer to superintend the institution, which is equivalent to an annual donation of at least 12,000 rupees. Altogether the committee will commence their work under most favourable auspices.

MR. E. A. MINCHIN, whose election to a Fellowship at Merton College, Oxford, we noted last week, was placed in the first class in the Honour School of Natural Science (Animal Morphology) in 1890, and has since been a Demonstrator in the Linacre Department of Comparative Anatomy. It is understood that the examiners sent in a special report to Merton College, to the effect that all of the eleven candidates for the Fellowship acquitted themselves with distinction, and were, in the opinion of the examiners, fully up to the standard required.

THE following appointments have recently been made in America:—Mr. W. S. Aldrich, Professor of Mechanical Engineering, West Virginia University; Mr. F. F. Almy, Professor of Physics, Iowa College; Dr. Charles E. Coates, Professor of Chemistry, Louisiana State University; Dr. A. J. Hopkins, Professor of Chemistry, Westminster College, Pa.; Dr. H. B. Loomis, Assistant Professor of Physics, Northwestern University; Dr. M. M. Metcalf, Professor of Biology, Woman's College of Baltimore; Mr. A. M. Muckenfuss, Professor of Chemistry, Millsaps College, Miss.; Mr. S. L. Powell, Professor of Natural Sciences, Newberry College, S.C.; Dr. H. L. Russell, Assistant Professor of Bacteriology, University of Wisconsin; Dr. J. N. Swan, Professor of Chemistry, Monmouth College, Illinois.

IN a recent *Bulletin* the State Board of Health of Michigan makes the assertion that the statistics of sickness indicate a connection between atmospheric ozone and influenza. Speaking generally, influenza increases with the proportion of ozone in the atmosphere. On the other hand, remittent fever decreases as the proportion of ozone increases.

THE following science lectures will be given at the Royal Victoria Hall during January:—Prof. Smithells on "Flame"; Mr. R. W. Frazer on "Life in South India"; Mr. F. W. Rudler on "Diamonds"; and Dr. Waghorn on "Our Eyes, their merits and failings."

WRITING upon "South American Meteorology," in the *American Meteorological Journal* for December, Prof. W. H. Pickering remarks that the Harvard College Observatory has four meteorological stations in Peru, all within one hundred miles of one another. The first is at Mollendo, on the sea coast, with an altitude of 100 feet: the second is at La Joya, in the desert—altitude 4140 feet; the third is the observatory in the Arequipa oasis—altitude 8060 feet; and the fourth is at the Ravine Camp upon Mount Chachani—altitude 16,600 feet. A fifth has recently been established, by Prof. S. I. Bailey, upon the summit of the Misti, at an altitude of 19,200 feet. The observations made at these observatories will doubtless lead to a much more accurate knowledge of the meteorology of Southern Peru than we at present possess.

AT the meeting of the Royal Society of New South Wales, on November 1, Mr. H. C. Russell described a new form of rainfall map. Instead of having different tints to indicate different amounts of precipitation, Mr. Russell divides the area over which the observations extend into square degrees, and by means of large figures printed on each square, shows to the nearest quarter of an inch the mean rainfall for that spot. Other smaller figures are used to show the number of years the observations have been made, and the number of stations used to find the mean. The map thus gives a large amount of information about the average rainfall of a country, and, at the same time, it shows in a conspicuous manner lines of equal rainfall and outlines of large areas of heavier rainfall, like the shaded maps; giving, in addition, what the shaded map cannot exhibit, viz. the variations in the rainfall of these areas of heavier rain. A map of New South Wales was prepared on this principle by Mr. Russell, specially to meet the wants of the agriculturist; but after it had been completed, it was found to serve the requirements of the meteorologist better than any map constructed on the shaded plan.

IN *Hansa* of the 9th instant, Captain C. H. Seemann discusses the meteorological conditions which accompanied or preceded the slight outbreak of cholera at Hamburg this year, and the serious epidemic of 1892. A comparison of the curves of the temperature of the air and the water of the Elbe for the corresponding period of each year shows scarcely any difference, while the level of the river was lower near Hamburg this year. It appears from the facts brought forward, that meteorolgical conditions were in no way connected with the outbreak or spread of the disease, and that the cause must be attributed entirely to the accidental contamination of the water of the Elbe.

An abstract on the "Occurrence of Amber in Russia," by Fr. Th. Köppen, is published in *Petermann's Mitteilungen*, November 1893, pp. 249–253. The original paper by the same author appeared in a Russian publication. Amber is found on the Baltic shores, the south coast of the Gulf of Riga, and in turf-moors or ancient gulfs of Kurland, embedded below thin beds of turf or sea-sand. Farther north, it occurs on the shores of the Oesel Island, and even in South Finland. The Polish localities along the river Narew are supposed to have been those referred to by Pliny. The most extensive occurrence is in the western provinces of Russia, and in different places on the banks of the Dneiper. From these facts, the "amber-formation" may be said to occur in Western Russia, from the Baltic to the Black Sea. A recent paper, written by N. Sokolow, shows that the lower tertiary deposits of Southern Russia extend also throughout this area. Sporadic appearances of amber occur in the southern parts of Bessarabia in brown-coal strata; they are possibly associated with the amber found in Roumania. Other Russian localities are the Arctic shores of Russia and Siberia, and on the Sea of Okhotsk. A sketch-map accompanies the text, showing the distribution of lower tertiary deposits according to Sokolow, and the most important occurrences of amber in Russia.

Last week's number of *Die Natur* concludes a series of eleven articles written by A. and S. Ortleb. The title of the series is "Introduction to specimen-collecting, geological and palæontological." The early chapters run rapidly through the physical and geological history of the development of our earth, and point out the significance of the fossils found in sedimentary beds. A short, systematic description follows of the chief groups in the plant and animal kingdoms. A few of the more interesting genera are mentioned, illustrations are given along with the text, and care is taken to bring out the particular epochs and localities to which the fossil representatives belong. This admirable contribution to popular scientific literature will supply a want widely felt among amateur collectors in Germany.

Mr. M. Carey Lea, who recently described a method of transforming mechanical work into chemical action in the *American Journal of Science*, has been continuing these interesting researches, and gives a description of some further remarkable results in the current number of the same journal. Instead of an enormous simple pressure, he tried shearing stress, and obtained more striking and apparent reactions than by the former method. In one series of experiments he placed a small quantity, a few decigrams, of a metallic salt in a mortar, spread it into a thin uniform sheet over the bottom, and rotated the pestle with the utmost force that could be exerted. Two of three decigrams of chloroaurate of sodium left 1·8 milligram or metallic gold. Under the action of the pestle the yellow colour of the salt gradually deepened to an olive shade. When water was poured on, the undecomposed salt dissolved, leaving the gold as a delicate purple powder. Half an hour's trituration of half a gram of the salt resulted in the reduction of 9·2 mgrms. of gold. This reduction represented the conversion of about 500 gram-meters work into chemical energy. Since the reaction is endothermic, there is no doubt that the energy was derived from the mechanical power. That the reaction was not produced by heat was proved by carrying on the operation intermittently, when the reaction took place in the same way, and also by the partial reduction of corrosive sublimate to calomel by a similar operation. By heat, corrosive sublimate sublimes unaltered. The same conclusion can be drawn from other reactions. Salts of mercury, platinum, and silver gave results analogous to those in the case of gold. In another series of experiments Mr. Carey Lea imbued pure strong paper with a solution of the substance, dried it thoroughly, and laid it upon a piece of plate glass. Characters were then marked on it with the rounded end of a glass rod, using as much pressure as possible without tearing the paper. Marks were thus immediately obtained in the case of potassium ferricyanide, gold and platinum chlorides, mercuric oxide, and many silver salts. The author accounts for the more immediate action of shearing stress in effecting chemical changes by the increased vibration and consequent shattering of the molecules, the action being analogous to that brought about when a bow is drawn over a stretched cord.

The third number of the *Physical Review* contains a paper, by Alexander Macfarlane and G. W. Pierce, on the electric strength of solid, liquid, and gaseous dielectrics. In the course of a previous research Dr. Macfarlane had found that the "electrical gradient" necessary to force a spark through a thin stratum of dielectric diminishes as the thickness increases, when air or other gas is the dielectric, but remains constant when turpentine or other insulating liquid is the dielectric. Mr. Steinmetz has shown that solid dielectrics, such as paraffined paper, behave in the same way as the liquid dielectrics. In order to obtain more trustworthy observations on these points, the authors have compared the electrical gradient necessary to break down different solid and liquid dielectrics with that required in the case of air. For this purpose they employed two discharging tables, each table supporting two parallel discs about 4 inches in diameter, the connecting rods being joined to the poles of a Holtz electrical machine, so as to form two alternative paths for the discharge. One of the tables, that used for the air gap, was provided with a micrometer by which the distance between the plates could be measured. The sheets of dielectric were placed between the other pair of discs, and the air gap enlarged till a spark passed through the solid dielectric. The difference of potential required was calculated from the length of the air gap, using the results published by Macfarlane and Steinmetz. The equivalent thickness of air is not proportional to the thickness of the solid or liquid, but increases more rapidly as the stratum increases in thickness; the difference of potential, however, required to break down a solid or liquid dielectric is proportional to the thickness. Thus it appears that while thin strata of solid or liquid dielectrics are equally strong whatever the thickness, thin strata of gaseous dielectrics grow weaker as the thickness increases. The authors consider that this difference is not due to a surface phenomenon, but to the greater rarity of the gas which allows discharge by convection to be more readily set up. They find that for liquids, when the thickness is considerable, convection currents are sometimes started, and that in this case the discharge takes place at a lower difference of potential.

Wiedemann's Annalen for December contains a description of a modified form of Thomson quadrant electrometer, which has been employed by Herr F. Himstedt. The chief characteristics are the employment of the form of needle which Lord Kelvin uses in his multicellular voltmeter, suspended by a quartz fibre. The lower end of the row of needles carries an insulating stem, to which are fixed two small magnets. These magnets are placed with their axes vertical, so that the earth's magnetism has no tendency to cause rotation of the needles, and are surrounded by a thick copper shield, the induced currents in which damp the oscillations of the needle. The fibre by which the needle is suspended is covered with a thin coat of deposited silver, so that it conducts, and thus allows the needle to be charged. With a period of 22 seconds, and when the needle is charged by means of 80 small accumulators, one Clark cell gives a deflection of 800 scale divisions on a scale 250 c.m. from the instrument.

Just now Saxony, of which Chemnitz is the most important manufacturing centre, is interested in the comparisons being made in Switzerland between steam-power plants and electricity gained by utilising water. In connection with this subject the United States Consul at Chemnitz has recently made the following remarks (*Board of Trade Journal*):—"It used to be urged that Switzerland's water supply, if properly utilised for obtaining electricity, would reduce very considerably her cost of production. Not only has she many streams, but they fall from such heights that even rivers of small volume have great power. . . . Every effort that science could suggest, ingenuity devise, or mechanics arrange, was made in different cantons of the little Republic to gather electricity by, and transmit it from, her rivers and streams. The latest reports show that if Switzerland, or any country with streams and climate like hers, is to win her way into the world's markets and take a place in the front ranks, it must be by some better method than the use of electricity gained and transmitted from rivers and waterfalls." Electricians will doubtless have something to say on this matter.

One of the factors in the so-called self-purification of river-water is regarded by some authorities to consist in the destruction and oxidation by bacteria of some at least of the organic material present. Prof. Pettenkofer, who has been investigating the condition of the river Isar, in the vicinity of Munich, is of opinion that the green living algæ found in this water also play no unimportant part as purifying agents. Prof. Schenck (*Centralblatt f. Allgem. Gesundheitspflege*, 1893), who has been making a special study, from this point of view, of the Rhine in the neighbourhood of Cologne, mentions that, to his surprise, he found comparatively few algæ where most impurities were present, the former being apparently crowded out by the large masses of bacteria. On the other hand, Prof. Percy Frankland has recently stated that, contrary to what might have been anticipated, he found a comparatively small number of bacteria present in the water of a loch, which was so turbid that it was practically opaque when viewed in a glass, by reason of the immense number of algæ present. Dr. Schenck's investigations were carried out to ascertain if the city of Cologne could with safety discharge its sewage untreated direct into the river, relying upon the processes of subsequent self-purification for the water to regain its normal condition. The mass of algæ found was remarkably small, being chiefly confined to the shallows along the banks, or to those spots where protection was afforded from the rush of the stream; the varieties, moreover, present were found to vary very considerably at different seasons of the year. But according to Prof. Schenck, the condition of the river banks in the immediate vicinity of the site selected for the entry of the Cologne sewage is very suitable for the aggregation of masses of bacteria, and he maintains that in conjunction with other factors of purification, such as mass of water and rate of flow, &c., a rapid and thorough purification of the water may be expected. Whatever the general opinion may be of the wisdom of Prof. Schenck's advice, his investigations show that the alleged action of green algæ as important water purifiers cannot be accepted without reservation, but that in the case of each river or stream the nature and growth of these plants must be studied.

The first part has been sent to us of a work entitled *Sporozoen als Krankheitserreger* (Berlin: Friedländer and Sohn, 1893), by Dr. Alexis Korotneff, Professor at the Kiew University, and Director of the Zoological Laboratory in Villafranca. This "Heft" is devoted to "Untersuchungen über den Parasitismus des Carcinoms," and is illustrated by four beautifully coloured plates showing the structure of the tissue in cancerous tumours, and the presence of parasites in various stages of development. The large amount of work which has been published during the last three years since Nils Sjöbring's paper on the parasitic nature of this disease appeared, renders a critical summary, such as Dr. Korotneff has written, of particular interest. The author admits, however, that personally the number of cancerous cases which he has examined is insignificant, but adds that the greater part of the drawings which have appeared in the works of Sudakewitsch, Sawtschenko, Kossinsky, Ruffer, and others on this subject, which are based upon observations made upon hundreds of cases, agree almost entirely with his own, and that he therefore considers his experience sufficient to justify him in expressing an opinion, not only on those cases examined by him, but also "über jede andere Krebsgeschwulst."

The Calendar of the Imperial University of Japan for the year 1892–93 has been received.

The latest volume of the useful Aide-Mémoire Series, edited by M. Léauté, and published by MM. Gauthier-Villars, is on the "Choix et Usage des Objectifs Photographiques." The author is Prof. E. Wallon.

We have received a descriptive catalogue of the exhibits in the Anthropological Building of the Chicago Exposition. The anthropological laboratories contained three general subdivisions, viz. physical anthropology, neurology, and psychology. Sections were also devoted to growth and development, and to the anthropology of North American Indians.

A statement has been published of the origin, plan, and results of the field and other experiments conducted on the farm and in the laboratory by Sir J. B. Lawes, at Rothamsted, for the last fifty years. To the general statement are appended lists of the titles of all the published papers dealing with Rothamsted work, with full reference to the journals in which they appeared.

Mr. S. H. C. Hutchinson, the Meteorological Reporter for Western India, has sent us a brief sketch of the meteorology of the Bombay Presidency from April, 1892, to March, 1893, inclusive. The year 1892 was one of barometric minimum, and consequently one of excessive rainfall throughout the whole of the Presidency. In some respects the meteorological conditions resembled those of 1878.

Pathologists will welcome the publication of a new "Descriptive Catalogue of the Anatomical and Pathological Specimens in the Museum of the Royal College of Surgeons of Edinburgh," vol. i. In this volume the specimens which exemplify affections of the skeleton and organs of motion are described. A subsequent volume or volumes will include specimens relating to the alimentary canal, the respiratory system, &c. Mr. C. W. Cathcart, the Conservator of the Museum, deserves the thanks of all members of the medical profession for his useful and carefully compiled work.

The *Bulletin* recently issued by the committee for the execution of the photographic star-map, contains Prof. Kapteyn's investigations on the systematic differences between the photographic and visual magnitudes in different parts of the sky. M. Loewy contributes his second memoir on the construction of the catalogue founded on the *clichés* of the star-chart, and M. Prosper Henry describes the methods of measurement and reduction of the *clichés* for the catalogue, adopted at the Paris Observatory.

'A monograph of the North American Proctotrypidæ," by Mr. William H. Ashmead, forms *Bulletin* No. 45 of the U.S.

National Museum. In it is given a systematic description of the species of the hymenopterous family *Proctotrypidæ* found north of Mexico; the genera of the world being also studied and described, as an aid to future students. The Proctotrypidæ are considered by some authorities to be closely allied to the Chalcididæ, which they usually follow in catalogues and lists of hymenopterous families. Mr. Ashmead considers, however, that there is little affinity between the two, and that such an arrangement is unnatural. He thinks that the Proctotrypidæ should be placed at the head of the Terebrantia, for after the removal of the group Mymarinæ (which probably forms a separate and distinct family allied to the Chalcididæ), there is no relationship with the Chalcididæ.

THE first volume of "Studies from the Physical and Chemical Laboratories" of the Owens College has been published, and it furnishes evidence of the large number of important investigations carried on by the alumni of the College. The volume contains thirty papers in all, most of which have been reprinted from the Transactions and Proceedings of various societies. A paper by Mr. J. A. Harker, "On the Reaction of Hydrogen with Chlorine and Oxygen," has been translated from the *Zeitschrift für Physicalische Chemie*, and appears in English for the first time. Among the papers not previously published is one "On New Forms of Stereometers," by Mr. Haldane Gee and Dr. Harden, and another "On the Duration of Chemical Action in the Explosive Combination of Gases," by Dr. Turpin. The council of the Owens College has done a good work by collecting and publishing the results of researches made in its laboratories during the last few years.

IN his paper on the "Glacial Striæ in Somerville," Mr. Upham concludes, from a large series of observations, "that the currents of the ice-sheet were deflected here from one course to another, and even to several successive courses in so short a time that it allowed no great amount of erosion of the rock beneath." The general motion of the ice-sheet during the period of its maximum thickness was south-south-east over the Boston area, but it was deflected eastward during the recession of the ice. The long axes of the drumlins have also an eastward direction, and Mr. Upham finds in this fact evidence that they were formed wholly during the time of deflected glacial movements.

SINCE the publication, in 1868, of Pasteur's classical work, "Études sur le vinaigre," the only contributions of importance to this subject are those made in this country by Mr. Adrian Brown. It is, therefore, interesting to learn that Dr. Lafar intends devoting special attention to the whole question of the fermentation of vinegar, and the *Centralblatt für Bacteriologie*, vol. xiii. p. 684, 1893, contains his first contribution to, as well as a short review of, the existing literature on this important subject. In the course of his researches at the Institute for the Experimental Investigation of Fermentation Industries near Stuttgart, Dr. Lafar obtained a species of yeast which rendered beer strongly acid, and on studying its behaviour in other alcoholic media it was found to produce vinegar. The various observations made with this interesting organism are conveniently brought together in a table, and include the determination of the amount of vinegar produced, the changes, both in taste and smell, induced in the media, the formation of surface-film, &c. In his next communication, Dr. Lafar hopes to furnish more exact particulars of the physiological and bacteriological characters of this vinegar-producing yeast.

THE *Illustrated Archæologist* for December contains a number of very fine illustrations. Among the articles is one "On the Excavation of a Pictish Tower in Shetland," by Mr. G. Goudie. The author thinks that the remarkable round towers with the remains of which the islands of Orkney and Shetland are studded may be assigned a date as far back as the commencement of the Christian era, or earlier. Mr. Arthur Elliot writes on "Some Old Towers at Liège," and Mr. J. Romilly Allen, "On the Celtic Brooch, and how it was Worn." Dr. R. Munro contributes some notes on flint saws and sickles, in which he discusses the differences between Egyptian sickles and the saws found in the Polado lake-dwelling near Desenzano. He is of the opinion that there is little or no evidence that such sickles were in use among the prehistoric people of Western Europe, though compound saws of the kind discovered at Polado may be found among the *débris* of prehistoric civilisations beyond that of the lake dwellings of Europe.

THE additions to the Zoological Society's Gardens during the past week include a Macaque Monkey (*Macacus cynomolgus*) from India, presented by Sir F. D. Dixon-Hartland, Bt., M.P.; a Ring-tailed Coati (*Nasua rufa*) from South America, presented by Mr. Kenelm Chandler; two Arctic Foxes (*Canis lagopus*) from the Arctic Regions, presented by the Duke of Hamilton, K.T.; a Red Kangaroo (*Macropus rufus*) from Australia, two Short-toed Eagles (*Circætus gallicus*) European, deposited; a Moloch Lizard (*Moloch horridus*) from Australia, presented by Mr. John Carter.

IN line four of article "Experiments on Flying" (NATURE, December 14), read $n^{\frac{7}{2}}$ instead of n^7.

OUR ASTRONOMICAL COLUMN.

COLOUR-ABERRATION OF REFRACTING TELESCOPES.—At a recent meeting before the Royal Astronomical Society, the proceedings of which will be found in the *Observatory* (No. 208, December), Mr. H. Dennis Taylor read an abstract of a paper entitled "The Secondary Colour-Aberration of Refracting Telescopes in Relation to Vision," which had for its aim the determination of the detriment to vision, if any, and the percentage of light lost for defining purposes, owing to the presence of the usual colour-aberrations. In the colour curves which the author exhibited, where the wave-lengths and longitudinal colour-aberrations were represented by the ordinates and abscissæ respectively, some remarkable facts were brought to light. A comparison with Captain Abney's curves of the luminous intensity of the normal solar spectrum gave a means of obtaining a rough estimate of the percentage of light thus lost. The following table gives one a rough idea of these losses for different objectives in the case of star work, 100 representing the whole amount of light transmitted:—

Objective.	Focal length. Feet.	Light lost.
36-inch Lick Telescope ...	57 ...	27
24 ,, Refractor	30 ...	42
12 ,, ,, ...	15 ...	21
6 ,, ,, ...	$7\frac{1}{2}$ ...	9
28 ,, Greenwich Refractor ...	28 ...	50

Other conclusions which the author draws from the above inquiry may be stated as follows:—In large telescopes the light-gathering power for star work by no means increases as the square of the aperture, the focal length being constant, but a point is reached when it increases simply as the aperture. With a given large aperture the light-grasping power can be considerably augmented by increasing the focal length. In the case of large telescopes, a smaller telescope of relatively large focal length may actually excel in light-grasping power a telescope of larger aperture and shorter focal length. In his concluding remarks Mr. Dennis Taylor refers to the increase of size in the images of stars under increasing exposures; this, he says, can be accounted for by the photographing of the halo of wasted light which surrounds the real image. If further research corroborates the views above stated, there seems to be no doubt that there is still room for improvement in rendering our lenses more perfectly achromatic. Of course the main point in large telescopes is to have them as short as possible, and it is satisfactory to notice the comparative smallness of the light lost in the 36-inch Lick instrument.

STARS WITH REMARKABLE SPECTRA.—The present list (*Astr. Nach.* No. 3200) is a continuation of that which appeared in a previous number of the same journal (*Astr. Nach.* No. 3171).